A-Day: Due Wed., Nov 29 (Assigned: 11/27)
B-Day: Due Wed., Nov 30 (Assigned: 11/28)

Momentum 2

1) When we are talking about energy, a force does _____. In this chapter a force causes _____.
2) A force causes an object to _____ up or _____ _____.
3) When an object changes speed it changes m_____.
4) So a force causes a c_____ of _____. This is known as an i_____.

5) Force A is 10 N. Force B is 30 N. Both forces push on identical 5 kg objects to accelerate them from rest to 10 m/s.
   A) Since the objects are at originally at rest, their initial momentum is:
   B) Find their final momentum.

   C) Find the change of momentum (Δp) to speed up the 5 kg objects (it's the same amount for both).

   B) Using the impulse equation ($\Delta p = F\Delta t$), how long does Force A act on the object?

   C) How long does Force B act on the object?

   D) Which force gave more momentum to the object?
   E) Which object accelerates the object faster?

   F) So, to accelerate an object you have two choices. Give them:

6) An egg dropped on a concrete floor experiences more or less Δp than an egg dropped on a pillow?
7) The egg dropped on the concrete floor experiences more or less impulse than the egg dropped on a pillow?
8) How come the egg dropped on the pillow survives (don't use any words like to "softer" or "absorbs"; think of Q1 above)?

9) A 5 kg object slows from 20 m/s to 15 m/s in 6 seconds.
   A) First find the change of momentum.

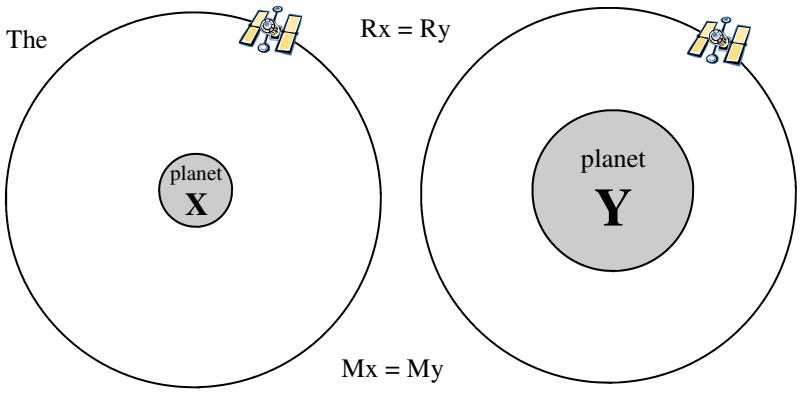
   B) Using your impulse equation, find the force that caused this.

10) A 2 kg object going 10 m/s feels a 3 N force for 6 seconds.
    A) Find the impulse on the object.

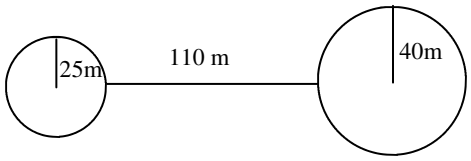
    B) Find the final velocity of the 2 kg object.

11) The two satellites are identical (same mass, same orbit). The masses of the planets are equal, but planet X is smaller.
    A) For planet X: draw m_1, m_2, and r.
    B) How do the forces of gravity compare?

    C) Since Planet X is smaller, it is more _____.
    D) If the satellites were to land on the planet surfaces, which probe will be the heaviest?



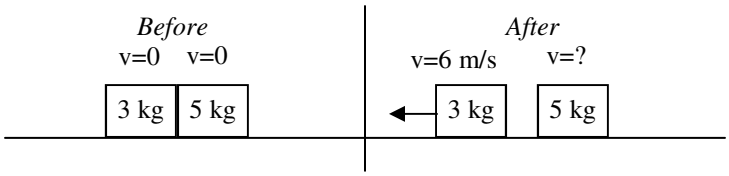
12) For the two objects at the right, what would be "r" in the gravity equation?



13) A spaceship (m = 3.5 x 10^5 kg) is 8.9 x10^7 m above a planet (m = 5.8 x 10^{22}; radius of planet = 2.45 x 10^7).
A) Find "r" for the Force of Gravity equation.

B) Set up the equation for the force of gravity.

C) Solve for the force of gravity.



14) A 3 kg object and a 5 kg object are at rest (*see above*). They push off from each other. Afterward the 3 kg object ends up going 6 m/s to the left.

A) Σp_{before} =

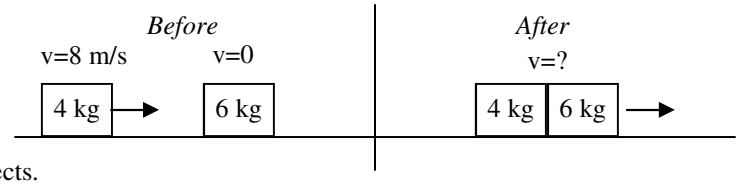
B) Since momentum must be conserved. Σp_{after} must =

C) How many objects are moving afterwards?

D) p_{after} of the 3 kg object is negative or positive?

E) Afterwards is the 5kg object going right or left?

F) Find the velocity of the 5 kg object.



15) A 4 kg object moving 8 m/s to the right hits a 6 kg object at rest. If they stick together after the collision, find the final velocity of the combined objects.

A) How many independent objects are there before?

B) Find the total momentum before.

C) What must the total momentum be afterward?

D) How many independent objects afterward?

E) What is the total mass after?

F) Find the final velocity of the combined object.